# <Preliminary>Elimination of Colonies of Coptotermes formosanus Shiraki (Isoptera: Rhinotermitidae) and Reticulitermes speratus (Kolbe) (Isoptera: Rhinotermitidae) by Bait System

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# Elimination of Colonies of *Coptotermes formosanus* Shiraki (Isoptera: Rhinotermitidae) and *Reticulitermes speratus* (Kolbe) (Isoptera: Rhinotermitidae) by Bait System*[1]

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## 1. Introduction

Increased public concern about environmental issues naturally encourages scientists to work on novel termite control measure in order to reduce environmental impact. Physical barriers have some potential and are standardized in Australia. Biological approach is also promising in the United States. Bait system has been extensively studied and commercialized in the United States[1–8], while the system has not been examined in Japan. Applicability of bait system was evaluated by using hydramethylnon and hexaflumuron as bait toxicants in this study. Bait applications were conducted with *Coptotermes formosanus* Shiraki and *Reticulitermes speratus* (Kolbe).

## 2. Experimental

### 2.1 *C. formosanus*

Three nests were transferred into the termite field test site of Wood Research Institute of Kyoto University in Kagoshima from their original habitats nearby on January 27, 1995. The nests were separately buried in the ground together with some wooden stakes as food. Two of these were used in the present investigation. Approximately 40 monitoring stations, consisting of 4 wooden stakes (3×3×35 cm) were set up, being driven into the ground to concentrically surround the nest to estimate the population size by a mark-release-recapture program[9] from July through October, 1996.

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Baitings started on November 6, 1996 for hydramethylnon application. Three tubes were in the positions of wooden stakes by replacing one of the four stakes, and one bait station was installed near the one of attacked monitoring station. For hexaflumuron application, three tubes and two bait stations near the two of monitoring stations were placed as the same for hydramethylnon. Baits were renewed twice during the period from April 16 to July 24, 1997. On September 24, 1997, two more bait tubes were set up. Approximately once a month, the colonies were monitored monthly-basis from April 16, 1997. Termites were collected from monitoring stations and released into each bait tube or station at every inspection so that they were forced to pass through the bait matrix. Baits were renewed three times, and from July 24, 1997 the number of bait tubes was reduced to two.

### 2.2 *R. speratus*

Wooden stakes (3×3×25 cm) were driven into the ground around a termite-infested stump in Uji campus of Kyoto University in order to estimate the foraging territory and population by a mark-release-recapture program. Estimations were made from October to November, 1994 and from August to September, 1995 for the colony of hexaflumuron application. Baiting started on October 3, 1995. Three bait tubes were placed, and two bait stations were installed as described above. Baits were renewed three times by November 21, 1995 and at every replacement, captured termites were released back to the bait tubes. Foraging activity was monitored biweekly from May, 1996. For the hydramethylnon test colony, the estimations of foraging population and territory were made from August to October, 1996. Baiting started on October 25, 1996. Two bait tubes and one bait station were installed. Baits were renewed twice in 1997. Foraging activity was monitored biweekly from May 23, 1997. At every inspection, captured termites were released to bait tubes and stations.

## 3. Results and Discussion

### 3.1 *C. formosanus*

The foraging population of the test colony for hydramethylnon was approximately 132,000 (±22,000). On September, 1997, the activity of the colony was found to be depressed. And on August, 1997, no termites were collected from any monitoring station. Therefore, on September 25, 1997 the nest was dug out to examine the presence/absence of termites inside and around the nest. It was clear that the colony was eradicated by baiting with hydramethylnon. The consumption of the bait matrix was about 29 g which was equivalent to 87 mg of hydramethylnon. At the time of recovery of nest, two monitoring stations were infested by termites of the other colony.

The foraging population of the test colony for hexaflumuron application was about

270,000 (±50,000). On October, 1997 the foraging activity declined, and on December 3, 1997 no termites were found. On March, 1998, however, the colony regained its activity. It would be likely that decline in foraging was caused by the cold weather. The total weight of the active ingredient ingested by termites was 22.2 mg.

### 3.2 *R. speratus*

The foraging populations of the test colony for hexaflumuron application were 470,000 in 1994 and 310,000 in 1995. On June, 1996, the activity of the colony declined, and on July 12, 1997 no marked termites were found. In 1996, inspections were conducted biweekly, and the elimination was finally confirmed on October 4. However reinfestation was found on May 2, 1997. Even though there was no marked termites among the termites collected, it was impossible to determine whether they were members of the eradicated colony or not, because the last release of the marked termites was on July 5, 1995, and persistence of marking was unclear in the field. The total weight of the active ingredient eaten by termites was 33.3 mg.

The foraging population of the test colony for hydramethylnon was 109,000. In June, 1997 the decline in foraging activity was noticed, and on July 2 no termites were found. But on August 9, 1997 marked termites returned to the stakes, although the activity looked suppressed, because the number of the infested stakes were reduced. The total weight of the active ingredient taken by termites was 44.7 mg.

It can be said that bait system can suppress the foraging activity of subterranean termite colony. It, however, might be difficult to eliminate termites for a long time without eradicating all the colonies in the applied area.

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